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BLAKELY SOKOLOFF TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD
SEVENTH FLOOR
LOS ANGELES, CA 90025-1030

EXAMINER	
NGUYEN, LEON VIET Q	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/789,553	SEDARAT, HOSSEIN	
	Examiner	Art Unit	
	Leon-Viet Q. Nguyen	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☒ Claim(s) *6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/24/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 3/4/2005 was filed after the mailing date of 3/4/2005. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

1. Claim 6 objected to because of the following informalities:

   a. The claim reads "N are an amount..." . The claim should read "N *is* an amount..."

   Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 6, it is unknown what the t_{-M} and w_0 matrix values refer to. Also r_{xx}, r_{yy}, and r_{xy} are not distinctly pointed out as either autocorrelation or cross-correlation functions.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3, 5, 7-8, 11-13, 16-18 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Erdogan (US20030112860).

Re claim 1, Erdogan discloses an apparatus, comprising:

a receiver configured to receive multi-tone signals (¶0001, the invention is used in discrete multi-tone communication systems), wherein the receiver has a Time Domain Equalizer filter (TEQ filter 1014 in fig. 10c, ¶0479) employing an algorithm to shorten a length of an incoming impulse response (¶0479, the TEQ filter shortens the impulse response) to equal to or less than a guard period (¶0458. The guard sequence or cyclic prefix is a value v which is greater than or equal to the length of the channel impulse response) by calculating a minimum mean square error solution (¶0479. The channel impulse response is shortened in response to the minimum mean square error.

It is inherent that the mean square error would be calculated) in combination with measuring an inter-symbol interference of a channel (¶0481. To determine if a resultant vector has minimum energy Inter Symbol Interference, it would be necessary to measure the Inter Symbol Interference).

Re claim 2, Erdogan discloses an apparatus wherein the Time Domain Equalizer filter uses filter coefficients to make the impulse response be approximately equal in width to the guard period (¶0458, ¶0477, the shortened channel impulse response defined by processing received data through the TEQ coefficients. Furthermore, the shortened channel impulse response must be less than or equal to the guard sequence, which is interpreted to be approximately equal).

Re claim 3, Erdogan discloses an apparatus further comprising:

a delay compensation module to determine an initial delay value to apply to the impulse response (¶0013, the equalization delay parameter is interpreted as the initial delay value) as well as supply a set of delay values for the minimum mean square error solution (¶0013, ¶0479. Although not explicitly disclosed, Erdogan suggests more than one delay parameter. Furthermore the time domain equalizer filter coefficient, which minimizes the mean square error e_k, is based on the delay parameter)

Re claim 5, Erdogan discloses an apparatus wherein the Time Domain Equalizer filter uses a matrix equation to determine a solution for the minimum mean-square error

(¶0488-¶0491. The minimized mean square error $E(e_k^2)$ using w and b where w and b are the matrix equations).

Re claim 7, Erdogan discloses a Digital Subscriber Line modem containing the apparatus of claim 5 (¶0001, the invention is used with equipment such as modems and for systems using ADSL or VDSL).

Re claim 8, Erdogan discloses a method, comprising:

calculating an estimation of a first value for a center delay (¶0493, the delay value d) to shift an impulse response to a beginning of a block of time domain data in a multiple tone signal (¶0491, the delay value is fixed as the starting location of the impulse response);

creating a set of values around the first value estimate (¶0507) to shift the impulse response that includes at least the first value for the delay and a second value for the delay (¶0013. Although not explicitly disclosed, Erdogan suggests using more than one delay parameter and the delay parameter is interpreted as the delay value);

calculating a first minimum mean square error (block 1210 in fig. 12, calculating and minimizing the mean square error e_k) to determine coefficients of a Time-domain Equalizer algorithm based up the first value for the delay (block 1106 in fig. 11, ¶0013, ¶0492, ¶0494. The method arrives at a set of filter coefficients w_k by minimizing the error, with the delay d being used in minimizing e_k) so that the length of the overall impulse response is approximately equal to or smaller than a guard period (¶0458.

The guard sequence or cyclic prefix is a value v which is greater than or equal to the length of the channel impulse response); and

receiving a measurement of a first value of an inter-symbol interference of a channel (¶0014. To determine if the energy Inter Symbol Interference has been minimized, it would be necessary to measure the Inter Symbol Interference) after the first minimum mean square error is applied to the multiple tone signal (¶0014. The minimizing module for minimizing mean square error criterion).

Re claim 11, Erdogan discloses a method further comprising:

selecting a single tap to be set at a fixed value in a target impulse response model (¶0495, one of the taps of b is constrained as b_L=c where c is not equal to 0) to prevent the target impulse response model from having a calculated zero result when modeling the target impulse response (¶0495, a finite length constraint is imposed on b to avoid the trivial all-zeros solution).

Re claim 12, Erdogan discloses a method wherein the estimation of the first value for a center delay value in the set of delay values (¶0506, choosing a delay d) is based on locating a window of time that covers samples of the multiple tone signal with a highest power of channel impulse response (¶0506. Choosing d as the location of the maximum value of the impulse response. This is interpreted as the highest power).

Re claim 13, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 8. It would be inherent to have a machine readable medium with instructions to execute the method as claimed in claim 8.

Re claim 16, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 11.

Re claim 17, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 12.

Re claim 18, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 8. It would be inherent to have an apparatus to perform the method as claimed.

Re claim 21, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 11.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Erdogan (US20030112860) as applied to claim 1 above, and further in view of Wynn (US5952914).

Re claim 4, Erdogan fails to teach an apparatus wherein the Time Domain Equalizer filter recalculates minimum mean square error based on a set of two or more delay values. However Wynn teaches a finite-impulse-response filter least-mean-square-error adaptive filter (col. 4 lines 30-34) which minimizes the mean square error (col. 5 lines 5-7). Weights are updated by the delay units 520, 522, and 524 and updated adaptively to minimize the mean square error (col. 5 lines 3-7).

Therefore taking the combined teachings of Erdogan and Wynn as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of updating the mean square error of Wynn into the receiver of Erdogan. The motivation to combine Erdogan and Wynn would be to increase the signal-to-noise ratio and increase the communication bandwidth of power line communication systems (col. 1 lines 38-43).

5. Claims 9, 14, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erdogan (US20030112860) as applied to claim 8 above, and further in view of Tsujimoto (US5524125).

Re claim 9, Erdogan fails to teach a method further comprising:

selecting the second value for the delay, where the second value deviates a fixed amount from the first value for the delay; and

calculating a second minimum mean square error based up the second value for the delay.

However Tsujimoto teaches selecting a second value for the delay, where the second value deviates a fixed amount from the first value for the delay (col. 10 lines 58-60. The adjusting factor is interpreted to be a delay value. Since the second MMSE control system adjusting factor is larger than the first MMSE control system adjusting factor, it would be necessary for second value to deviate from the first value); and

calculating a second minimum mean square error (col. 10 lines 29-31) based up the second value for the delay (col. 10 lines 58-60, the adjusting factor of the second MMSE control system).

Therefore taking the combined teachings of Erdogan and Tsujimoto as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of using a second delay value of Tsujimoto into the receiver of Erdogan. The motivation to combine Erdogan and Tsujimoto would be to set up the cancellation of interfering waves faster (col. 10 lines 62-64).

Re claim 14, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 9.

Re claim 19, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 9.

6. Claims 10, 15, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erdogan (US20030112860 and Tsujimoto (US5524125), further in view of Tsuie (US20040223449).

Re claim 10, the modified invention of Erdogan teaches a method further comprising:

receiving a measurement of a second value of an inter-symbol interference of a channel (¶0014 in Erdogan. To determine if the energy Inter Symbol Interference has been minimized, it would be necessary to measure the Inter Symbol Interference) after the second minimum mean square error is applied to the multiple tone signal (¶0014 in Erdogan. The minimizing module for minimizing mean square error criterion. Although not explicitly disclosed, one of ordinary skill would have found it obvious that a second MMSE value as taught in Tsujimoto in claim 9 would yield a second value of inter-symbol interference); and

shortening a length of an incoming channel impulse response by applying a time-domain equalizer algorithm (¶0479 in Erdogan, the TEQ filter shortens the impulse response) that uses a selected delay value (block 1106 in fig. 11, ¶0013, ¶0492, ¶0494 in Erdogan. The method arrives at a set of filter coefficients w_k by minimizing the error, with the delay d being used in minimizing e_k) to shorten the length of incoming impulse responses to approximately equal to or less than a guard period (¶0458 in Erdogan.

The guard sequence or cyclic prefix is a value, v, which is greater than or equal to the length of the channel impulse response).

However the modified invention of Erdogan fails to teach identifying the lowest value for the measured inter-symbol interference of a channel and selecting the delay value associated with that measurement. Tsuie teaches eliminating a very small value of ISI (¶0010. The very small value of ISI is interpreted to be the lowest. Furthermore, it would be obvious to one of ordinary skill in the art that to determine a very small ISI, it must be identified). Tsuie also teaches choosing a guard time, which is selected based on the expected delay associated with the ISI (¶0010).

Therefore taking the modified teachings of Erdogan and Tsujimoto with Tsuie as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of identifying a small value of inter-symbol interference of Tsuie into the receiver of Erdogan and Tsujimoto. The motivation to combine Tsuie, Erdogan and Tsujimoto would completely eliminate ISI (¶0010) and provide a method which is effective against multi-path delay spread (¶0010).

Re claim 15, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 10.

Re claim 20, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 10.

7. Claim 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Erdogan (US20030112860) as applied to claim 18 above, and further in view of Parr (US5627859).

Re claim 22, Erdogan fails to teach an apparatus wherein the estimation of the first value for the center delay is based on a best linear fit to a phase of a channel frequency response. However Parr teaches giving a filter fixed delay as a function of frequency, called linear phase (col. 7 lines 9-11). Furthermore it would have been obvious to one of ordinary skill in the art to base the delay on a line of best fit, which is a well-known mathematical representation of data.

Therefore taking the combined teachings of Erdogan and Parr as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of determining a filter delay of Parr into the receiver of Erdogan. The motivation to combine Erdogan and Parr would be to improve RMS phase error (col. 6 lines 61-62). It is also well known in the art that best-fit lines are used to minimize the effects of random errors in measurements.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon-Viet Q. Nguyen whose telephone number is 571-270-1185. The examiner can normally be reached on monday-friday, alternate friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Nguyen/

David C. Payne

DAVID C. PAYNE
SUPERVISORY PATENT EXAMINER